

CLAIMS

What is claimed is:

1. A weight bearing element comprising:
 - a web; and

at least one chord coupled to the web, the at least one chord having a perimeter, the perimeter having a polygonal cross-sectional shape having at least 5 sides, at least two of which are substantially parallel to the web.
2. The weight bearing element of claim 1 wherein the cross section of the at least one chord, excluding any portion in parallel with and connected to the web, has a shape of a regular or irregular pentagon, the chord being connected to the web at the vertex of one angle of the pentagon.
3. The weight bearing element of claim 1 further comprising a fill material in the cavity of at least one of the at least one chord.
4. The weight bearing element of claim 1 wherein the at least one chord consists of two substantially parallel chords coupled to opposite sides of the web.
5. The weight bearing element of claim 4 wherein the chord further comprises at least 5 planar sides, each side corresponding to one side of the closed multi-sided figure of the cross-sectional shape of the chord.
6. The weight bearing element of claim 5 wherein the number of planar sides is equal to A where A is one of 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 or A is greater than 15.
7. The weight bearing element of claim 5 wherein each of the at least 5 planar sides is less than N inches thick where N is one of 1, .75, .5, .25, .125, and .1.
8. The weight bearing element of claim 5 wherein each of the at least 5 planar sides comprises X gauge steel where X is one of 20 and 18.
9. The weight bearing element of claim 5 formed by roll forming a single sheet of material into the web and at least one chord.

10. The weight bearing element of claim 5 wherein

the exterior surface of one of the at least 5 planar sides is a top mounting surface;

the exterior surface of one of the at least 5 planar sides is a left side mounting surface;

the exterior surface of one of the at least 5 planar sides is a right side mounting surface;

the exterior surface of one of the at least 5 planar sides is a left transition surface; and

the exterior surface of one of the at least 5 planar sides is a right transition surface;

wherein

the left side mounting surface and the right side mounting surface are each substantially parallel to the web;

the top mounting surface is substantially perpendicular to the web;

the left side mounting surface, the right side mounting surface, the left transition surface, and the right transition surface each comprise a top edge and a bottom edge;

the top edge of each of the left side mounting surface and right side mounting surface are coupled to the top mounting surface;

the bottom edge of the left side mounting surface is coupled to the top edge of the left transition surface, and the bottom edge of the right side mounting surface is coupled to the top edge of the right transition surface;

the left and right transition surfaces extend away from all of the top mounting surface, the left mounting surface, and the right mounting surface; and

the bottom edge of each of the left transition surface and right transition surface is coupled to the web.

11. The weight bearing element of claim 10 comprising at least two chords and at least one load transfer member coupled to and extending between the at least two chords, the load transfer member having a back and two sides, wherein the back is mounted flush to either the left or the right side mounting surfaces of the at least two chords, and the two sides of the load transfer member extend outward from the back and the side mounting surfaces of the chords.
12. The weight bearing element of claim 10 comprising at least two chords and at least one end cap coupled to and extending between the at least two chords, the end cap having a back and two sides, wherein a first side of the two sides of the end cap is mounted flush to the left side mounting surface of the at least two chords, a second side of the two sides of the end cap is mounted flush to the right side mounting surface of the at least two chords, and the back connects and extends between the two sides of the end cap such that the end cap, if the back were mounted to an external support, would transfer a load placed on the weight bearing element to the external support.
13. A weight bearing element comprising a planar segment, the planar segment comprising a stiffening member extruding from the planar segment and comprising at least two sets of sides wherein each set of sides comprises at least two sides forming an angle of less than 45 degrees.
14. The weight bearing element of claim 13 wherein the stiffening member comprises two sets of two sides, the two sets being positioned adjacent each other so as to form a four sided diamond shape.
15. The weight bearing element of claim 14 wherein the diamond shape comprises four angles formed by adjacent sides, the four angles comprising two approximately equal angles less than or equal to 45 degrees positioned opposite each other and two approximately equal angles less greater than or equal to 135 degrees positioned opposite each other.
16. A weight bearing member comprising:

an upper segment, a lower segment, and a back segment formed into an approximate C shape;

a plurality of pairs of shear tabs positioned along the length of the back segment, each pair of tabs comprising a top tab adjacent the top segment and a bottom tab adjacent to the bottom segment, the top and bottom tabs in vertical alignment with each other and separated by a distance of at least 4", each tab comprising at least one fastener hole;

a plurality of diamond shaped stiffeners positioned along the length of the back segment.

17. The member of claim 16 wherein a stiffening member is positioned each adjacent pair of shear tabs.
18. A weight bearing member comprising at least two sets of vertically aligned shear tabs, the shear tabs within a set being separated by a distance of at least 4", and the sets of shear tabs being positioned along a length of the member and separated by a distance of between 7 and 10 inches.
19. A method of forming a weight bearing member comprising:
 - providing a weight bearing member comprising a planar surface;
 - cutting, punching, or otherwise forming a vertical opening in the planar surface;
 - forcing the surface surrounding the opening into a diamond shape.
20. A weight bearing system comprising at least one of the weight bearing elements of claims 1-12, and at least one of the weight bearing elements of claims 13-18.
21. A method for building structures comprising:
 - providing a rim band;
 - positioning the rim band on top of one or more lower studs;
 - coupling one or more joists to the rim band such that the combination of rim band and lower studs at least partially supports the one or more joists;
 - positioning one or more upper studs on top of the rim band such that the combination of rim band and lower studs at least partially supports the upper studs.

22. The method of claim 20 wherein the rim band comprises upper and lower horizontal segments wherein the lower horizontal at least partially supported by and coupled to the lower studs and the upper studs are at least partially supported by and coupled to the upper horizontal segment.
23. The method of claim 21 wherein the end of a joist is positioned between the upper and lower segments of the rim band such that it is directly above a lower stud and directly below an upper stud.
24. The method of claim 22 wherein one side of each of the upper stud, the lower stud, and the joist have a side positioned in or adjacent to a common vertical reference plane.
25. The method of claim 23 wherein a second side of each of the upper stud, the lower stud, and the joist have a side positioned in or adjacent to a second common vertical reference plane, the second vertical reference plane being parallel to the first vertical reference plane.
26. The method of claim 20 wherein the rim band comprises at least one of the weight bearing elements of claims 13-18.
27. The method of claim 20 wherein the joist comprises at least one of the weight bearing elements of claims 1-12.
28. The method of claim 20 wherein the rim band comprises at least one of the weight bearing elements of claims 13-18, and the joist comprises at least one of the weight bearing elements of claims 1-12.